

CLAIMS:

1. A computer keyboard, comprising:

a plurality of keys, each key of the plurality having an unpressed condition in which no force is exerted upon the key by a user and a pressed condition in which force is exerted on the key by a user; and

a force detection circuit configured to:

scan each key of the plurality to determine if a scanned key is in a pressed condition,

quantify, upon determining that a scanned key is in a pressed condition, the force exerted by a user on said key determined to be in a pressed condition, and

proceed, upon determining that a scanned key is not in a pressed condition, to another key of said plurality without attempting to determine a force exerted on the key determined not to be in a pressed condition.

2. The computer keyboard of claim 1, wherein the plurality of keys includes multiple character keys having respective characters assigned thereto and a plurality of modifier keys, and wherein the force detection circuit comprises a microprocessor configured to generate a first signal upon detecting a character key to be in a pressed condition and to generate a different signal upon detecting said character key and a modifier key to simultaneously be in a pressed condition.

3. The computer keyboard of claim 1, further comprising:

a first group of conductors;

a second group of conductors positioned in close proximity to the first group of conductors, the first and second groups of conductors forming a plurality of intersections between first group conductors and second group conductors; and

a force sensitive resistive element located between the first group conductor and the second group conductor of each of the plurality of intersections, wherein

each of the plurality of intersections corresponds to an associated key of the plurality of keys, each of the associated keys configured to compress the resistive element located at the corresponding intersection upon exertion of force on the associated key, and

the force detection circuit is configured to determine force exerted upon each of the associated keys based upon changes in resistance value of the resistive element at each corresponding intersection.

4. The computer keyboard of claim 3, wherein:

the force detection circuit comprises a microprocessor and a voltage divider, and

the microprocessor is configured to place the voltage divider in a first condition when scanning each key of the plurality to determine if a scanned key is in a pressed condition and in a second condition when quantifying the force exerted by a user on a key determined to be in a pressed condition.

5. The computer keyboard of claim 4, wherein:

the voltage divider includes a voltage measuring node,

when the force detection circuit is in the first condition, voltage at the voltage measuring node varies within a first range as a key is pressed,

when the force detection circuit is in the second condition, voltage at the voltage measuring node varies within a second range as a key is pressed, and

the second range is larger than the first range.

6. The computer keyboard of claim 4, further comprising an Analog to Digital Converter (ADC), and wherein:

the microprocessor determines a scanned key is in a pressed condition when voltage on a tested conductor of the corresponding intersection reaches a threshold value, and

the microprocessor, after determining the scanned key is in a pressed condition, instructs the ADC to output a digital value of a voltage on the tested conductor.

7. The computer keyboard of claim 3, wherein the detection circuit comprises a microprocessor and a RC network.

8. A computer keyboard, comprising

a grid of first group conductors and second group conductors, the first and second group conductors forming a plurality of intersections;

a force-sensitive resistive element at each intersection of the plurality located between the first and second group conductor forming said intersection;

a plurality of keys located above the plurality of intersections, each key being associated with one intersection and configured to exert force on the conductors and force-sensitive resistive element of the associated intersection during a key press;

a microprocessor having a plurality of first group conductor pins each in contact with one of the first group conductors and a plurality of second group conductor pins each in contact with one of the second group conductors;

a sub-circuit connected to at least one of the second group conductors, the sub-circuit having a resistor network switchable by the microprocessor between a low resistance value and a high resistance value; and

an Analog to Digital Converter (ADC) coupled to the sub-circuit and to the microprocessor.

9. The computer keyboard of claim 8, wherein the microprocessor is configured to:
  - ground to an individual conductor pin,
  - test another conductor pin for a threshold voltage level while the resistor network is switched to the high resistance value,
  - switch the resistor network to the low resistance value upon detecting the threshold voltage level on the tested conductor pin, and
  - receive from the ADC a digital value of a voltage on the tested conductor pin while the resistor network is switched to the low resistance value.

10. The computer keyboard of claim 9, comprising a plurality of sub-circuits connected to a plurality of conductors of the second group of conductors.

11. The computer keyboard of claim 9, wherein the microprocessor is configured to:  
store the identity of a plurality pressed keys and force values associated with the pressed keys, and  
generate a data message containing the identities and associated force values.
12. The computer keyboard of claim 11, wherein the microprocessor is configured to generate the data message in the form of a Human Interface Device (HID) report.
13. The computer keyboard of claim 9, wherein the plurality of keys includes multiple character keys having respective characters assigned thereto and a plurality of modifier keys.
14. The computer keyboard of claim 13, wherein the plurality of keys includes at least 36 character keys.
15. The computer keyboard of claim 9, wherein the microprocessor is configured to:  
sequentially test each key for a key press by grounding a conductor pin connected to one of the conductors forming the associated intersection and testing for the threshold voltage level on the other of the conductors forming the associated intersection, and  
receive, for only the keys for which the threshold voltage level was detected, the digital value from the ADC.

16. The keyboard of claim 15, wherein the microprocessor is configured to generate a data message containing identifiers for multiple keys of the plurality for which the threshold voltage level was detected and digital values from the ADC corresponding to the multiple keys.

17. A microprocessor having preprogrammed instructions for performing steps comprising:

placing a detection circuit in a first state in which an identity of a pressed keyboard key is determined;

placing the detection circuit in a second state in which an amount of force applied to a pressed key is measured;

scanning each key of a keyboard for pressed keys by testing each key for a key press when the detection circuit is in the first state;

measuring, when the detection circuit is in the second state and only as to pressed keys, the force applied to the pressed keys.

18. The microprocessor of claim 17, wherein said measuring comprises receiving a digital value for detection circuit voltage, and having additional preprogrammed instructions for performing steps comprising:

instructing an Analog to Digital Converter (ADC) to convert a detection circuit voltage to a digital value; and

reading from the ADC a digital value for the detection circuit voltage.

19. The microprocessor of claim 17 having additional preprogrammed instructions for performing steps comprising:

storing an identifier for multiple pressed keys;

storing force measurements for the multiple pressed keys;

generating a data message containing the stored identifiers and force measurements.

20. The microprocessor of claim 19, wherein said generating a data message comprises generating a Human Interface Device (HID) report.

21. The microprocessor of claim 17 wherein said scanning each key comprises scanning at least 36 separate keys.

22. The microprocessor of claim 17 having additional preprogrammed instructions for performing steps comprising:

selecting a conductor pin from a group of conductor pins;

testing the selected conductor pin for a threshold voltage level;

upon detecting the threshold voltage level on the selected conductor pin, placing the detection circuit in the second state by altering the resistance of a resistance network; and

when in the second state, receiving a digital value for a voltage on the selected conductor pin.